What is claimed is:

1. A sintered bioactive ceramic composite for implant, comprising a zirconia-alumina nano-composite-powder and an apatite-related compound, wherein zirconia primary particles having a particle diameter of 10-50 nm and alumina primary particles having a particle diameter of 10-100nm are sintered to form the nano-scale composite in a secondary particle state.

2. The sintered bioactive ceramic composite for implant of claim 1, wherein the apatite-related compound is at least one compound selected from the group consisting of hydroxyapatite, carbonateapatite, fluoroapatite, oxyapatite, fluorohydroxyapatite, Sr-doped hydroxyapatite, Sr-doped carbonateapatite, Sr-doped fluoroapatite, Sr-doped oxyapatite, Sr-doped fluorohydroxyapatite, Mg-doped hydroxyapatite, Mg-doped carbonateapatite, Mg-doped fluoroapatite, Mg-doped oxyapatite, Mg-doped fluorohydroxyapatite, Si-doped hydroxyapatite, Si-doped carbonateapatite, Si-doped fluoroapatite, Si-doped oxyapatite, and Si-doped fluorohydroxyapatite.

3. The sintered bioactive ceramic composite for implant of claim 1, wherein an amount of the zirconia-alumina nano-composite-powder is 50-99 vol%.

4. The sintered bioactive ceramic composite for implant of claim 1, wherein an amount of the apatite-related compound is 1-50 vol%.

5. The sintered bioactive ceramic composite for implant of claim 4, wherein the amount of the apatite-related compound is 20-40 vol%.

6. The sintered bioactive ceramic composite for implant of claim 1, wherein a content of zirconia in the zirconia-alumina nano-composite-powder is 50-99.9 wt%.

7. The sintered bioactive ceramic composite for implant of claim 1, wherein the zirconia-alumina nano-composite-powder further comprises an oxide of at least one metal selected from the group consisting of yttrium, magnesium, calcium,

cerium, niobium, scandium, neodymium, plutonium, praseodymium, samarium, europium, gadolinium, promethium, and erbium.

8. The sintered bioactive ceramic composite for implant of claim 1, wherein 0.1-60 parts by volume of the apatite-related compound is converted into tricalcium phosphate.

9. A method of preparing the sintered bioactive ceramic composite for implant, comprising:

preparing a zirconia-alumina nano-composite-powder;

mixing the zirconia-alumina nano-composite-powder with an apatite-related compound; and

sintering the resulting mixture.

10. The method of claim 9, wherein the preparing of a zirconia-alumina nano-composite-powder comprises:

mixing a mixed solution of polyhydric alcohol and carboxylic acid and a mixed solution of zirconium salt and aluminium salt;

heating the mixture to 100-300℃ to form a polyester network in which zirconium ions and aluminum ions are trapped; and

calcining the resultant at 400-1000℃.

11. The method of claim 9, wherein 50-99 vol% of the zirconia-alumina nano-composite-powder and 1-50 vol% of the apatite-related compound are mixed.

12. The method of claim 9, wherein the apatite-related compound is at least one compound selected from the group consisting of hydroxyapatite, carbonateapatite, fluoroapatite, oxyapatite, fluorohydroxyapatite, Sr-doped hydroxyapatite, Sr-doped carbonateapatite, Sr-doped fluoroapatite, Sr-doped oxyapatite, Sr-doped fluorohydroxyapatite, Mg-doped hydroxyapatite, Mg-doped carbonateapatite, Mg-doped fluoroapatite, Mg-doped oxyapatite, Mg-doped fluorohydroxyapatite, Si-doped hydroxyapatite, Si-doped carbonateapatite, Si-doped fluoroapatite, Si-doped oxyapatite, and Si-doped fluorohydroxyapatite.